MANZANAR NATIONAL HISTORIC SITE
GEOLOGIC RESOURCES MANAGEMENT ISSUES
SCOPING SUMMARY

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Executive Summary

Geologic Resource Evaluation scoping meetings for three parks in the Mojave Network were held April 28 - May 1, 2003, in St George, UT, Barstow, CA, and Twentynine Palms, CA, respectively. Unfortunately, due to time and travel constraints, scoping was not done at Manzanar National Historic Site (MANZ). The following report identifies the major geologic issues and describes the geology of MANZ and the surrounding the area.

The major geologic issues affecting the park are:

1. Flooding and erosion due to runoff from the Sierra Nevada mountains to the west.

2. Recurring seismic activity

3. The potential for volcanic activity from Long Valley Caldera

4. Proposed gravel pit upslope from MANZ

Introduction

The National Park Service held Geologic Resource Evaluation scoping meetings for three parks in the Mojave Network: Parashant National Monument, Mojave National Preserve, and Joshua Tree National Park. These meeting were held April 28 - May 1, 2003, in St George, UT, Barstow, CA and Twentynine Palms, CA respectively. The purpose of these meeting was to discuss the status of geologic mapping, the associated bibliography, and the geologic issues in the respective park units. The products to be derived from the scoping meeting are: (1) Digitized geologic maps covering the park units; (2) An updated and verified bibliography; (3) Scoping summary (this report); and (4) A Geologic Resources Evaluation Report which brings together all of these products. Although there was no onsite scoping for MANZ, these products will be produced for the historic site.

The Manzanar Relocation Center was established in March 1942, as the Owens Valley Reception Center, first run by the U.S. Army's Wartime Civilian Control Administration (WCCA) and later operated by the War Relocation Authority (WRA). The center was located at the former farm and orchard community of Manzanar, founded in 1910. The town was abandoned when the city of Los Angeles purchased the land in the late 1920s for its water rights. The Los Angeles aqueduct, which carries Owens Valley water to Los Angeles, is less than a mile east of Manzanar. The internment of Japanese Americans began on March 21, 1942. The national historic site was established March 3, 1992. Total area administered by the Park Service is 813.81 acres.

MANZ is located in the southern Owens Valley in east-central California. It lies mostly on the west side of U.S. Highway 395, 220 miles north of Los Angeles and 250 miles south of Reno, NV, between the towns of Lone Pine and Independence. The outlying portions of the relocation center are on land administered by the Los Angeles Department of Water and Power (LADWP) and public land administered by the Bureau of Land Management.

The only quad of interest is the Manzanar 7½' topographic quadrangle. Several geologic maps cover the quad and surrounding area including Beanland and Clark, 1994 (1:24,000); Stone, *et. al*., 2000 (1:62,500); and Ross, 1985, (1:62,500).

Physiography

Manzanar lies in the Owens Valley on the extreme western edge of the Basin and Range province. Immediately to the west is the Sierra Nevada physiographic province and to the east is the Inyo-White Mountains Range in the Basin and Range province. Owens Valley extends for about 150 miles, approximately from Haiwee Reservoir on the south to Lake Crowley on the north. Mount Williamson, the second highest peak in the Sierra Nevada at 14,375 feet, is 10 miles southwest. The National Historic Site is located where bajadas from the Sierra meet the valley floor at about 3,900 feet elevation.

The Owens Valley, in the rain shadow formed by the Sierra Nevada, has a mean annual precipitation of 5 to 6 inches. Although the valley is well-watered by streams, a considerable quantity of water is collected from the eastern flank of the Sierra Nevada by the LADWP via the Los Angeles aqueduct. The Historic Site is located between two perennial streams which flow east from the Sierra Nevada: Shepherd Creek on the north and Bairs Creek on the south. The water rights from both creeks are owned by the LADWP and the flow is captured by the Los Angeles aqueduct about one-half mile east of MANZ (National Park Service, 2002).

Geologic History and Stratigraphy

Manzanar National Historic Site lies in the Owens Valley on an easterly sloping alluvial fan approximately 5 miles east of the Sierra Nevada escarpment and 1 mile west of the Owens River. The gradient of this fan is approximately 6.5%, leveling to approximately 2.5% at the Historic Site. The alluvial fan consists of poorly sorted granitic boulders, cobbles, gravel, and sand grading to finer sand and silt within the boundary of the Site and towards Owens River (NPS, 2002).

The Owens Valley is the westernmost graben in the Basin and Range Province, bounded by two nearly vertical faults. The upthrown sides are the Sierra Nevada Range to the west and the Inyo-White Mountains to the east. The valley began forming about 3 million years ago in the Pliocene, gradually developing the relief observed today. Near Lone Pine there are about 10,000 feet of sediments in the valley.

In the Sierra Nevada about 60% of the exposed rock is composed of intrusive igneous rock of the Sierra Nevada Batholith, and most of that material is granitic (Norris and Webb, 1976). The batholith intruded pre-Jurassic rock and has been dated between 70 and 210 million years (Middle Jurassic to Late Cretaceous/Early Tertiary). Similar rock of approximately the same age crops out in the Inyo-White Mountains east of MANZ. The oldest Sierran rock are Ordovician metasediments which crop out as roof pendants near Lake Crowley, northeast of MANZ and east of Yosemite National Park. The Paleozoic section from Ordovician through Pennsylvanian is represented in the southern Sierra.

Crustal compression during the Nevadan (Jurassic) and Laramide (Late Cretaceous-Early Tertiary) orogenies caused extensive folding and thrust faulting and the uplift of the Sierra. The compressional episodes subsided by Eocene time and by the Miocene, crustal forces converted to extensional. Basin-and-Range-type horst and graben block faulting, listric en echelon faulting, and extensive right lateral faulting predominated, forming the topography we see today.

Significant Geologic Resource Management Issues at Manzanar National Historic Site

1. Flooding and erosion

The most immediate geologic resource management issue at Manzanar is the significant erosional channeling on the western side and sediment deposition on the eastern side of the unit (NPS, 2002). Both Shepard Creeks on the north and Bairs Creek on the south naturally top their banks and overflow into subsidiary channels during flood stage. Numerous channels have been eroded in the alluvial fan, trending parallel with Shepherd and Bairs Creeks. Overflows southerly out of Shepherd Creek and northerly out of Bairs Creek follow channels that trend towards the western boundary of MANZ. Natural overflow channels from Shepherd and Bairs Creeks carry floodwaters towards, and sometimes through, MANZ (NPS, 2002).

Staff from Mojave National Preserve visited the park April 30 to May 1, 2002, to evaluate the existing erosional impacts to the park and the potential threat of continued erosion to park resources (NPS, 2002). In the trip report dated May 31. 2002, they offered two alternatives: (1) actively control flooding by diversions on Shepherd and Bairs Creeks and construction of a flood control berm upgradient to deflect flow to the north and south; and, (2) allow floodwaters to flow through MANZ in maintained channels and relocate impacted cultural resources. The first alternative was recommended “since it would mitigate imminent damage to cultural resources. However, the second alternative should be considered as, a potentially necessary, long-term solution” (NPS, 2002).

2. Recurring seismic activity

The Owens Valley is seismically active. Owens Valley is a down-dropped, fault bounded valley (graben) with large uplifted blocks (horsts) on either side (the Sierra and the Inyo-White Mountain Range). Major fault systems extend the length of the valley. Continued Basin-and-Range down-dropping of the valley and uplift of the mountains as well as right-lateral faulting sympathetic to the San Andres Fault have resulted in major earthquake activity. The Lone Pine earthquake of 1872 was one of the largest quakes to occur in California in recorded time, with probably a magnitude of 8 or greater on the Richter Scale. At Lone Pine, 23 people were killed and most of the existing structures were destroyed. The quake caused rock slides as far north as Yosemite Valley, 110 miles to the northwest (Sharp and Glazer, 1997). Along the base of the Alabama Hills near Lone Pine, there were displacements for120 miles (Norris and Webb, 1976) as much as 4 vertical feet and 18 feet horizontally (Jessey and Wall). In 1986, a magnitude 6.4 earthquake, as well as thousands of aftershocks, occurred near the town Chalfant, north of MANZ. The threat of further large seismic events in the Owens Valley remains high.

3. Volcanic activity from Long Valley Caldera

In the upper reaches of the Owens River, northwest of Bishop, CA, is the Long Valley-Mono Lake volcanic area. This has been an area of frequent rhyolitic eruptions, some as recent as 600 yeas ago, from the Inyo Craters. These eruptions of the Inyo chain from Glass Creek, Obsidian, and South Deadman vents, include ash falls, pyroclastic flows, and lava flows covering over 9,000 km^2 (Miller, 1985). The Bishop Tuff is a welded volcanic ash and pumice deposited about 710,000 years ago from the eruption of the Long Valley Caldera. It has been estimated that 30 to 40 cubic miles of material was expelled. The threat of a major eruption from this area continues to the present.

4. Proposed gravel pit

A gravel pit for the extraction of fill material has been proposed for the an area to the west and upslope of MANZ. Any disturbance of surface material uphill from MANZ could result in increased erosion and sedimentation in the Historic Site.

5. Other potential issues include:

Surface subsidence resulting from the LADWP pumping large volumes of water from Owens Valley aquifers and exporting the water;

Windblown alkali dust from the desiccation of Owens Lake and Owens Valley.

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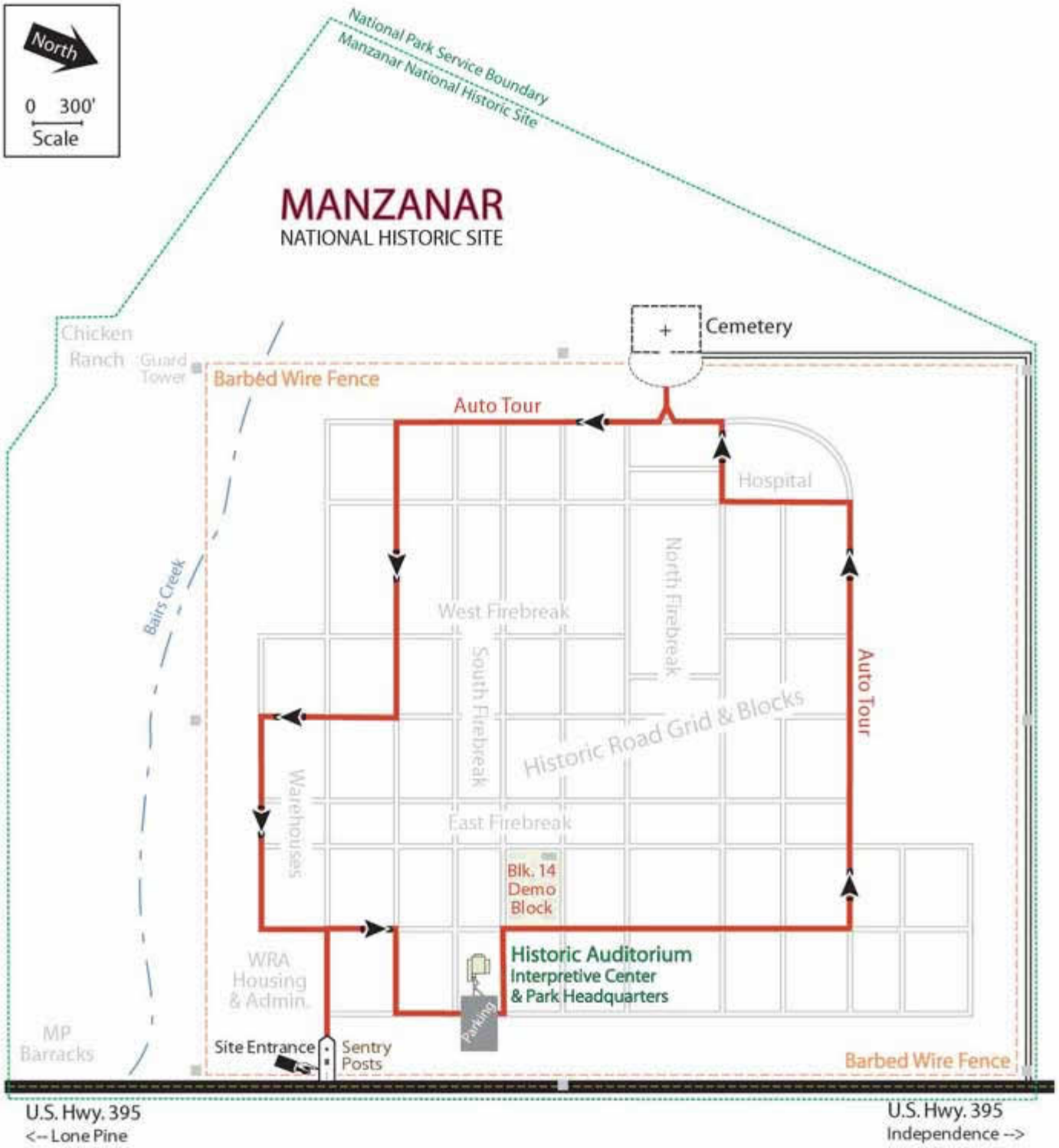
North
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Scale
National Park Service Boundary
Manzanar National Historic Site
MANZANAR
NATIONAL HISTORIC SITE
Cemetery
Chicken Ranch
Guard Tower
Barbed Wire Fence
Auto Tour
Hospital
Baits Creek
West Firebreak
North Firebreak
South Firebreak
Historic Road Grid & Blocks
Auto Tour
Warehouses
East Firebreak
Blk. 14 Demo Block
Historic Auditorium
Interpretive Center
& Park Headquarters
Parking
WRA Housing & Admin.
MP Barracks
Site Entrance
Sentry Posts
Barbed Wire Fence
U.S. Hwy. 395
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Independence -->